Should We Use Lean Manufacturing or ERP or Both?

Here's The Answer!

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Both

Yes, the answer is *both*. The objective of this paper is to explain *why* the answer is both. My conclusion is based on many years of working with and observing manufacturing companies from a wide variety of industries who were/are working on reducing inventory, reducing throughput times, lowering costs, and improving on-time shipments. In this presentation, I will share this experience and the basis for my conclusion.

The reason for '*both'* has to do with differentiating the concepts of planning and execution. For example, a supplier asks the question 'how much steel will you need during the next six months?' This is a planning question and is best handled by ERP. A shop supervisor wonders 'what am I going to run today?' This is an execution question and can be handled by ERP or preferably Lean Manufacturing techniques. Differentiating the questions can help a company understand the role of ERP and Lean.

Quite often, people say 'we are not going to use ERP anymore … we are going Lean'. This makes a clear statement that they don't fully understand the objectives of ERP and Lean Manufacturing, and do not understand the differences between planning and execution. I wonder how they are going to enter orders, or deal with the steel supplier question.

The following paragraphs will help the reader/attendee know the roles of ERP and Lean Manufacturing differentiate planning and execution, and know how to achieve a synergy using both ERP and Lean Manufacturing to manage a high performance manufacturing business.

Lean Manufacturing - A Brief Overview

The following is offered as a quick definitional overview of Lean Manufacturing. Essentially, Lean Manufacturing builds upon the teachings of Just-In-Time Manufacturing that we have all been studying for the past 20 years. In the book Lean Thinking by James P. Womack and Daniel T. Jones, Lean Manufacturing is explained in five steps:

1. Value This is the activity of systematically determining what products and/or services the customer is willing to pay for … and at what price.
2. Value Stream These are the activities, tasks, information flows, and/or production steps required to provide the specified value.
3. Flow This is the activity of physically arranging the value stream steps to flow quickly. It often requires a complete rethinking of the traditional “functional” world by dissolving departmental walls and co-locating resources. Only value-adding

steps should be included in the flow while cost-adding steps should be eliminated.

4. Pull The progression of steps in the value stream must be triggered by "downstream" steps and not "upstream" steps. In this way, a step will not be executed until the subsequent step is ready. All steps in the process become synchronized, loss-to-balance is readily identified, and additional waste is more easily identified and eliminated.
5. Perfection The "Lean" environment created by the first four steps will continue to work better as waste is continuously eliminated from the process.

ERP - A Brief Overview

Enterprise Resource Planning (ERP) is a company-wide information system that describes the next (current) generation of fully integrated and functionally complete manufacturing software products. It potentially includes demand management, order entry, production management, distribution management, EDI, electronic commerce, supply chain management, product data management, warehouse management, transportation planning, human resources, and others.

Planning

Planning is an activity that attempts to look into the future for making resource decisions. The short term planning horizon is typically a few days, the intermediate horizon is a few weeks, and the long-term horizon ranges between a few months to a few years. The questions dealt with by planning include:

- How much material is needed, especially for long lead-time high value items?
- How much labor is needed?
- How much critical machine/line capacity is needed?
- How much supplier capacity is needed for outsourced operations?
- How much cash is needed to support operations?

Decisions for these resources must be made in a timely manner since making resource adjustments takes time. Some materials have long lead-times … often several months. It takes time to find, hire, and train labor. Machine and facility capacity often takes many months to adjust. And, as we all know, cash is expensive and at times hard to get. Resource adjustments are difficult and take planning whether the company is adjusting them up or down. Imaging the case of a company having three facilities and consolidating into two. It takes planning and time to liquidate the third facility.

How ERP Helps Planning

There are two ways to plan: the MRP function of the ERP system is one way, and good old reorder point method is the other. ERP is a wonderful tool for planning. When setup and used correctly, ERP can provide wonderful management visibility on material

and capacity issues. Notice … the key concept is 'setup and used correctly'. This means a few things:

- Data elements are provided for proper information aggregation for management.
- The system contains only valid dates for computing requirements.
- Information is available in a timely and fit-for-use condition for all users.

One ERP related top management planning tool is Sales and Operations Planning (S&OP). The objective of S&OP is to balance demand and supply on a regular and formal basis, and to provide top management's handle on the business. One of the major outputs of this process is to specify run rates by manufacturing cell or line as a function of bookings, backlog, shipments, and inventory levels. Since Lean Manufacturing implementations generally result in organized value streams which appear as cells or lines in the factory, it is critical that the S&OP process be organized in terms that match the physical arrangement of the factory. This minimizes the need for subjective interpretation and post manipulation of the S&OP information, and it enables S&OP output to be entered into the ERP system for forward planning in the simplest way.

As a side note, the ERP system is still going to be used for order entry, accounting, inventory, engineering data, and other business functions regardless of how it is used in production and materials management!

Execution

Execution is an activity that attempts to determine what should be made and what should be purchased. Execution focuses on the next few hours or day and basically deals with the resources available at that time. Typical questions dealt with by execution may look like these:

- What will we run on line 770 this morning?
- What is the sequence of work for line 975 today?
- What steel will we release from suppler ABC for shipment today?

There are basically three ways that manufacturing companies deal with these questions today:

- Take action reports that come from ERP output.
- Visual communication methods (kanban is one of these).
- Very informally using disconnected spreadsheets, hot lists, and firefighting.

Using typical ERP execution, a planner/scheduler reads the 'take action' message and releases a work order to take care of the requirement. A packet of paper is presented to the first operation in the process as production starts.

Using a visual method, a signal (kanban card, kanban bin, electronic board) is sent from the using entity to the producing entity and production/supply is started. For example, an item is shipped from finished goods causing the need for replenishment. A kanban card is sent to line 975 and place on the kanban board for scheduling. The line supervisor determines when that item will be produced and then produces it.

Necessary work instructions are presented as "stationized planning". These are controlled engineering documents that are only reissued when a change occurs. By the way, there isn't a kanban system that can tell a supplier steel requirements for the next six months!

The third way … the informal way … is something most companies are trying to get away from. No discussion needed here, other than one point about disconnected spreadsheets. Many times, information is not available in a fit-for-use condition from the ERP system thus forcing the use of spreadsheets. This drives additional (and unnecessary) clerical labor, and normally results in two sets of numbers for running the business. This should naturally be avoided and can be solved most times by correctly using data elements and reporting functionality of the ERP system.

How Lean Manufacturing Helps Execution (and Planning)

The teachings of Lean Manufacturing and Just-In-Time help companies do a better job of execution and sometimes reduce the planning horizon. Reducing throughput times can shorten the planning horizon. And, it is the execution teachings, principles, and practices of Lean Manufacturing that help reduce the throughput time. Here are some of these principles and their effect on execution and planning.

Visual Kanban

Visual kanban eliminates the need to issue work orders as a means of authorizing production. When a need is recognized, people in the factory (or for that matter at any position in the supply chain) respond to the need by moving a card, moving a bin, or providing a build signal in some other way.

Visual kanban systems work well for "stock" parts in repeatable environments. For "non-stock" parts in a one-of-a-kind environment, kanban is more challenging from a maintenance point of view, but can be done.

Cellular/Line-Flow Factory Organization

Laying out the factory in cells or line-flow arrangements drastically reduces the distance parts must travel through the production process. Machines, people, and workstations are located much closer together which enables fast communication … many times through visual methods. One popular layout approach is to locate feeder lines adjacent to final assembly production lines.

This closeness eliminates the need for operational dispatching and operation completion transactions usually associated with a work order based functional factory. The only transaction needed is production completion for the end item.

By reducing the travel distance, throughput time is normally reduced … sometimes as much as 90%. This has a direct impact on the planning lead-times in the ERP system. As these lead-times are reduced, the planning horizon can be shortened which makes it more accurate.

The close proximity also enables visual kanban systems. On the final assembly line, operational move can be controlled via positional kanbans, and feeder lines can be controlled via kanban cards or kanban bins.

Connecting ERP Planning with Lean Manufacturing Execution

This is a missing link for most manufacturing companies. The challenge is determining how to plan using ERP and execute using visual kanban, and thus eliminate the need for work orders. Here is one way to do it.

Planning

- Plan all parts with the ERP system's MRP capability (except the parts coded as phantoms). With the fast speed of computers and systems today, this doesn't hurt a thing and can provide useful planning information.
- Drive the planning process from a robust S&OP process, which eliminates the need for individual end item forecasting thus simplifying the front-end planning.

Execution

- For "stock" parts (this means finished goods, in-process feeder parts, and/or raw materials and component parts):
  - Pull the kanban card from the product that was just issued or shipped.
  - Move the card to the producing line and put it on the "wait" side of the kanban board.
  - Periodically during the day, move the card to the "work" side of the board. The position on the board is limited by the line's daily run rate as specified in the S&OP process:
    - The board position is the due date.
    - The amount in one day is the daily rate driven from S&OP.
    - This is called Rate Based Due-Date-Driven® production.
  - When the card "crosses the line", a transaction is made to the ERP system showing the part number, due date (based on the board position), and the quantity (based on card quantity parameters).
  - When the parts are produced, the card is attached to the goods and flows to shipping, finished goods, or order staging.
  - A completion transaction is made to the ERP system.
- For "non-stock" parts:
  - Most companies find that using a work order is the best way, unless your ERP system has a way to automatically generate kanban cards when a requirement exists.
  - If the kanban method is desired, a planner creates a temporary kanban card and places it on the "wait" side of the kanban board.

The points above provide a summary of how this type of execution works. In actual practice, there are many details to work out concerning physical card logistics, number of cards, layout of container positions, application of ABC principles, and other design parameters. It's hard work and a "grind" to setup, but once in place, the kanban method

is a wonderful way to execute. Ideally, automating the cards and card movement is the way to go!

Data and System Requirements for ERP Planning and Lean Execution

For each and every part number in the system, several parameters must be known and recorded as data elements in the ERP system:

- Is the part stock or non-stock.
- How is the part planned: MRP or Order Point.
- How is the part replenished (executed): MRP take action or a visual method (card kanban, bin kanban, VMI, others).
- What are the related inventory parameters:
  - Order point (if needed).
  - Safety stock (if used).
  - Order quantity (if not lot-for-lot).
  - Lead-time (if not dynamic).
  - The producing cell/line where the part made (mapping parts to cells or flow-lines).
  - The destination of the part when it is complete.
  - The person who is accountable for planning the part.
  - The person who is accountable for executing the part.
  - The container type.
  - Number of parts in a container.
  - The number of kanban cards in the system.

There a few shortcomings of many ERP systems today that make working in a Lean Manufacturing environment a challenge. In the months and years to come, the successful ERP systems will:

- Have fully integrated S&OP capability.
- Have the ability to systemically resize kanban parameters as derived from the S&OP process.
- Have the ability to start and complete production without issuing a work order.
- Embrace the principles of Rate Base Due-Date-Driven© production.
- Automate the entire kanban card process to eliminate lost cards and card logistics.

Summary

We have learned that the answer to 'Lean Manufacturing or ERP' is BOTH! Not only is it a fundamental challenge for the system providers to adopt some new thinking, the user community must be reeducated in the principles of linking ERP with Lean Manufacturing. It is not intuitive or necessarily simple. But, armed with the understanding of the principles outlined in this presentation, ERP and Lean Manufacturing can provide synergistic business performance.

From this day on, the informed person will confidently answer this question, and have the facts to back it up!

J. E. Boyer Company, Inc. integrates lean manufacturing with enterprise resource planning to create world-class manufacturing environments where these two improvement strategies work together. We work on-site at your company. We do classroom training, one-on-one coaching, and project work … individually or as part of a team. We work at all levels of the organization from the boardroom to the stockroom! Since 1984, clients from a wide variety of industries have improved their operations in terms of cost management, on-time shipments, inventory investment, people development, operational speed, and overall business performance.

More information is available at: www.jeboyer.com

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